All India Test Series (2023-24)

Test Code: ANY/11

AITS TEST - 11

YAKEEN NEET

DURATION: 200 Minutes | **DATE: 25/04/2024** | **M. MARKS: 720**

Topics Covered

Physics:	Full Syllabus.
Chemistry:	Full Syllabus.
Botany:	Full Syllabus.
Zoology:	Full Syllabus.

General Instructions:

1. Immediately fill in the particulars on this page of the test booklet.
2. The test is of **3 hours 20 minutes** duration and the Test Booklet contains **200** multiple choice questions (four options with a single correct answer) from **Physics, Chemistry and Biology (Botany and Zoology)**. **50** questions in each subject are divided into **two sections (A and B)** as per details given below:
   (a) **Section A** shall consist of **35 (Thirty-five)** Questions in each subject (Question Nos. – 1 to 35, 51 to 85, 101 to 135 and 151 to 185). All Questions are compulsory.
   (b) **Section B** shall consist of **15 (Fifteen)** questions in each subject (Question Nos. – 36 to 50, 86 to 100, 136 to 150 and 186 to 200). In section B, a candidate needs to **attempt any 10 (Ten)** questions out of **15 (Fifteen)** in each subject.
   Candidates are advised to read all 15 questions in each subject of Section-B before they start attempting the question paper. In the event of a candidate attempting more than ten questions, **the first ten questions answered by the candidate shall be evaluated.**
3. There is only one correct response for each question.
4. Each **correct** answer will give **4 Mark** while **1 Mark** will be **deducted** for a **wrong** answer. The maximum marks are 720.
5. No student is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, any electronic device, etc. inside the examination room/hall.
6. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator on duty in the Room/Hall. However, the candidates are allowed to take away this Test Booklet with them.

OMR Instructions:

1. Use blue/black dark ballpoint pen.
2. Darken the bubbles completely. Don't put a tick mark or a cross mark where it is specified that you fill the bubbles completely. Half-filled or over-filled bubbles will not be read by the software.
3. Never use pencils to mark your answers.
4. Never use whiteners to rectify filling errors as they may disrupt the scanning and evaluation process.
5. Writing on the OMR Sheet is permitted on the specified area only and even small marks other than the specified area may create problems during the evaluation.
6. Multiple markings will be treated as invalid responses.
7. **Do not fold or make any stray mark on the Answer Sheet (OMR).**

Name of the Student (In CAPITALS): _____

Roll Number: _____

OMR Bar Code Number: _____

Student's Signature: _____ Invigilator's Signature _____

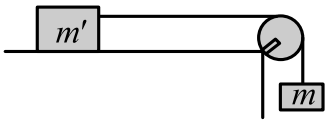
(PHYSICS)

SECTION-A

1. If a 10 μ*C* charge is placed inside a closed surface, then electric flux linked through the surface is ϕ. If 50 μ*C* charge now is placed with 10 μ*C* inside the closed surface then flux linked through surface is ϕ'. Then $\phi' - \phi$ (in terms of ϕ) is;

(1) 4ϕ (2) 5ϕ
(3) ϕ (4) 8ϕ

2. In the given figure below, masses *m* and m' are tied with a string passing over a fixed frictionless pulley and m' is placed on a frictionless horizontal surface. If acceleration due to gravity is *g*, then acceleration of *m* in this arrangement will be;



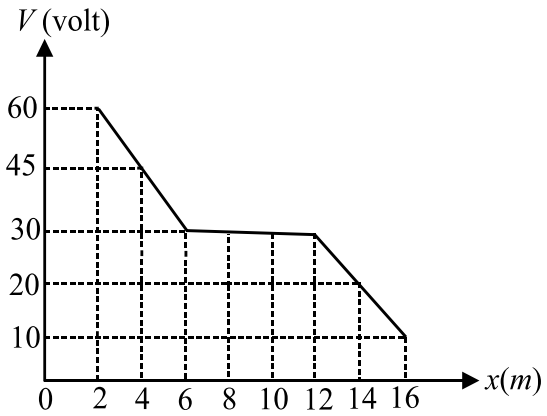
(1) g

(2) $\frac{m'g}{(m+m')}$

(3) $\frac{mg}{(m+m')}$

(4) $\frac{mg}{(m-m')}$

3. The variation of electric potential in a region with distance along *x* axis from a fixed point is shown in figure. The electric field at *x* = 14 m and at *x* = 8*m* respectively is;



(1) $7.5\hat{i}$ volt/meter, $2\hat{i}$ volt/meter

(2) $-7.5\hat{i}$ volt/meter, $0\hat{i}$ volt/meter

(3) $5\hat{i}$ volt/meter, $0\hat{i}$ volt/meter

(4) $-5\hat{i}$ volt/meter, $3\hat{i}$ volt/meter

4. A stone is projected vertically up such that it reaches maximum height '*h*'. The ratio of its kinetic energy to potential energy at a height $\frac{h}{5}$ will be; (Take *P.E.* at ground = 0)

(1) 5 : 4 (2) 4 : 5
(3) 1 : 4 (4) 4 : 1

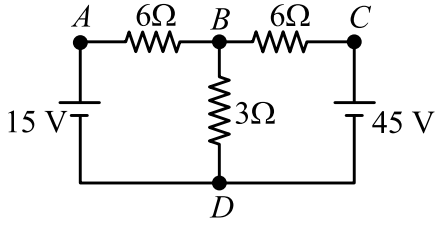
5. When two wires are joined in parallel their effective resistance is $\frac{4}{5}\Omega$. When one of the wire breaks and removed, the effective resistance is $1\,\Omega$. The resistance of the broken wire was;

(1) $3\,\Omega$ (2) $1\,\Omega$
(3) $2\,\Omega$ (4) $4\,\Omega$

6. For a body moving along *x*-axis, the distance travelled by body from a reference point is given as function of time *t* as $x = ct^3 + \frac{b}{t}$, where *c* and *b* are constant, then the dimensional formula of $\sqrt{cb}$ is same as dimensional formula of;

(1) speed
(2) distance
(3) acceleration
(4) momentum

7. A D.C. circuit is shown in figure, find the current through the branch *BD*.

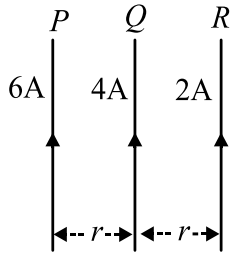


(1) 1 A (2) 5 A
(3) 3 A (4) 7 A

8. A projectile is thrown from ground such that it attains maximum possible horizontal range equal to 200m. Taking the point of projection as the origin, the coordinates of the point where the velocity of the projectile is minimum are; (Neglect air resistance)

(1) (100, 70) m
(2) (200, 50) m
(3) (100, 50) m
(4) (100, 100) m

9. *P*, *Q* and *R* are three long parallel straight wires which carrying currents in same direction as shown. The direction of resultant force on *Q* is; (All three wire are in same plane)



(1) towards left
(2) towards right
(3) perpendicularly outward to plane of paper
(4) perpendicularly inward to plane of paper

10. A particle of mass 3 kg is moving with uniform speed of $\sqrt{2}$ m/s along a line $y = x + 4$. Find out magnitude of angular momentum of particle about origin?

(1) $12\sqrt{2}$ kgm^2/s
(2) 12 kgm^2/s
(3) $3\sqrt{2}$ kgm^2/s
(4) Zero

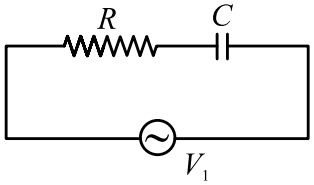
11. The intensity of magnetic field at point *X* on the axis of a small magnet is equal to the field intensity at another point *Y* on its equatorial axis. The ratio of distance of *X* and *Y* from the center of the magnet will be;

(1) 2^{-3} (2) $(2)^{-1/3}$
(3) 2^3 (4) $2^{1/3}$

12. A ball collides directly on a identical ball at rest. If $\left(\frac{1}{3}\right)^{rd}$ of the kinetic energy is lost by the impact, the value of coefficient of restitution is;

(1) $\frac{1}{2\sqrt{2}}$ (2) $\frac{1}{\sqrt{3}}$
(3) $\frac{1}{\sqrt{2}}$ (4) $\frac{\sqrt{3}}{2}$

13. A 40 V, 50 Hz A.C. source is connected across a resistor *R* and capacitor *C* as shown in figure below. If the voltage across *R* is 24 volts, then voltage across *C* is;

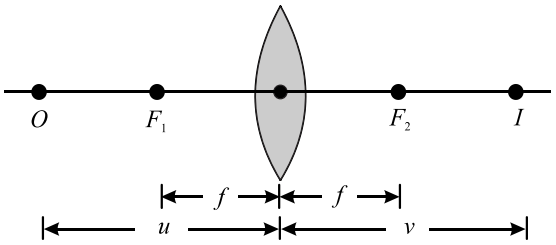


(1) 8 V (2) 32 V
(3) 10 V (4) 48 V

14. Water on surface of a 20 m deep river is observed to be flowing at 10 m/s. The shearing stress between horizontal layers of the river is; ($\eta = 10^{-3}$ SI units) (Velocity of bottom layer is zero)

(1) 10^{-3} N/m^2
(2) 0.8×10^{-3} N/m^2
(3) 0.5×10^{-3} N/m^2
(4) 1 N/m^2

15. A real object and its real image are located at distances 25 cm and 40 cm respectively from the two principal foci of a convex lens on either side. The linear magnification of the image is near to;

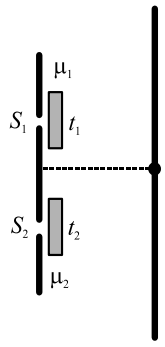


(1) + 1.3 (2) – 1.3
(3) + 1.8 (4) – 1.8

16. Potential energy of a 2 kg body at the surface of a planet is – 64 Joule, then escape velocity of body from surface is;

(1) 8 m/s (2) 16 m/s
(3) 36 m/s (4) 9 m/s

17. In a Young's double slit experiment, a slab of thickness t_1 = 1.5 mm and refractive index 1.8 is placed in front of one slit and another slab of thickness t_2 and refractive index 3.5 is placed in front of the second slit. If the position of the central fringe remains unaltered, then the thickness t_2 is;



(1) 0.48 mm (2) 0.96 mm
(3) 0.12 mm (4) 4 mm

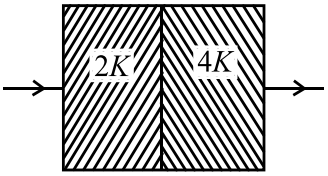
18. 1 kg of an ideal gas does 30 kJ of work and receives 16 kJ of heat when it is expanded between two thermodynamic states. A second kind of expansion can be found between the same initial and final state which requires a heat input of 18 kJ. The amount of work done by the gas in the second case of expansion is;

(1) 32 kJ (2) 5 kJ
(3) – 4 kJ (4) 13 kJ

19. If the mass of a particle as well as its speed are doubled, then de-Broglie wavelength associated with the particle will;

(1) increased by a factor more than 2
(2) increase by a factor of 2
(3) decrease by a factor of 2
(4) decrease by a factor more than 2

20. Consider a compound slab consisting of two different materials having equal thicknesses, equal length and thermal conductivities of 2*K* and 4*K*, respectively. The equivalent thermal conductivity of the slab is;



(1) $3K$ (2) $\frac{8}{3}K$

(3) $\frac{4}{3}K$ (4) $\sqrt{2}K$

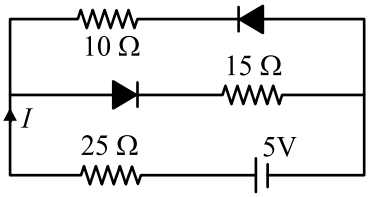
21. Kinetic energy of e^- revolving around Hydrogen atom in second Bohr's orbit is;

(1) – 3.4 eV (2) 3.4 eV
(3) + 13.6 eV (4) – 13.6 eV

22. The velocity of sound wave in air is 330 m/s. The fundamental frequency of an organ pipe of length 0.55 m which is open at both ends will be;

(1) 200 Hz (2) 550 Hz
(3) 300 Hz (4) 275 Hz

23. Current *I* in the circuit will be; (Assume ideal diode)



(1) $\frac{5}{40}A$ (2) $\frac{5}{50}A$

(3) $\frac{5}{10}A$ (4) $\frac{5}{20}A$

24. Relation between the ratio of specific heat (γ) of gas and degree of freedom '*f*' of gas will be;

(1) $\gamma = f + 2$

(2) $\frac{1}{\gamma} = \frac{1}{f} + \frac{1}{2}$

(3) $f = \frac{2}{\gamma - 1}$

(4) $f = 2(\gamma - 1)$

25. The electric potential at a distance $2\sqrt{2}R$ from the center on the axis of a uniformly charge circular ring of radius *R* having linear charge density λ is;

(1) $\frac{\lambda}{6\varepsilon_0}$ (2) $\frac{\lambda}{4\pi\varepsilon_0}$

(3) $\frac{\lambda}{3\varepsilon_0}$ (4) $\frac{\lambda}{6\pi\varepsilon_0}$

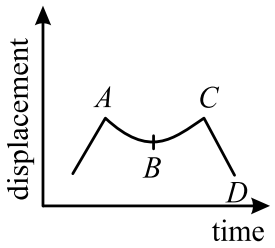
26. A thin copper wire of length *l* meter increases in length by 1.5% when heated by 20°C. What is the percentage increase in area when a square copper sheet of side length *l* meter is heated by 20°C?

(1) 3%
(2) 4%
(3) 1.5%
(4) None of these

27. A semicircular ring of radius 1 m is uniformly charged with a total charge of 4.2×10^{-9} *C*. The magnitude of electric field intensity at the center of this ring is approximately;

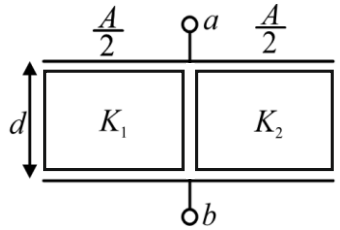
(1) Zero
(2) 320 V/m
(3) 240 V/m
(4) 24 V/m

28. Figure shows the displacement of a particle moving along *x*-axis as a function of time. The velocity of the particle is zero at;



(1) A (2) B
(3) C (4) D

29. The capacitance of a parallel plate air capacitor is 10 μF. As shown in the figure, if this capacitor is divided into two equal parts and these parts are filled by media of dielectric constant $K_1 = 3$ and $K_2 = 5$, then the capacitance of this arrangement will be;



(1) 20 μF (2) 40 μF
(3) 10 μF (4) 30 μF

30. A rope lies on a rough table such that a part of it hangs down the table. When the length of hanging part is $\left(\frac{1}{5}\right)^{\text{th}}$ of the entire length of the rope, it just begins to slide. The coefficient of friction between the rope and the table is;

(1) $\frac{1}{4}$ (2) $\frac{1}{6}$

(3) $\frac{1}{5}$ (4) $\frac{3}{4}$

31. When the angle of incidence of light ray travelling from air to material is 60°, the reflected light is completely polarized. The velocity of the refracted ray inside the material is; (in ms^{-1})

(1) 3×10^8 (2) $\sqrt{2}\times10^8$

(3) $\sqrt{3}\times10^8$ (4) 0.5×10^8

32. A particle is moving in a horizontal circular path. The net acceleration and linear momentum of the particle at a certain instant are $\vec{a}=\left(4\hat{i}+2\hat{j}\right)\text{m/s}^2$ and $\vec{p}=\left(8\hat{i}-5\hat{j}\right)\text{kg-m/s}$. The motion of the particle is;

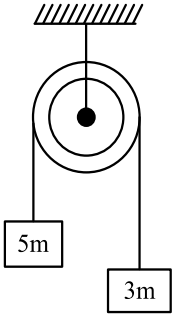
(1) Uniform circular motion
(2) Accelerated circular motion
(3) Decelerated circular motion
(4) None of these

33. In the nuclear reaction ${}_1^2\text{H}+{}_1^3\text{H}\rightarrow{}_2^4\text{He}+{}_0^1n$, if the binding energies of ${}_1^2\text{H}$, ${}_1^3\text{H}$ and ${}_2^4\text{He}$ are respectively *a*, *b* and *c* (in MeV), then the energy (in MeV) released in this reaction is;

(1) $a+b+c$ (2) $c+a-b$

(3) $c-a-b$ (4) $a+b-c$

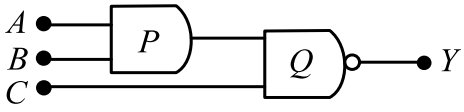
34. If the system is released, then the magnitude of acceleration of the center of mass of the system; (assume fixed, frictionless pulley) (*g* is the acceleration due to gravity)



(1) $\frac{g}{4}$ (2) $\frac{g}{16}$

(3) $\frac{g}{8}$ (4) $\frac{g}{12}$

35. What is the output *Y* in the following circuit when all the three inputs *A*, *B* and *C* are first 0 and then 1, respectively?

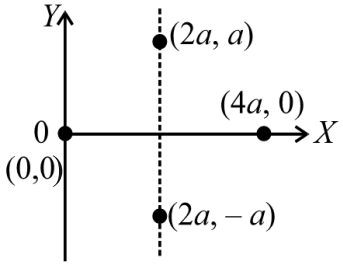


(1) 1, 0 (2) 1, 1

(3) 0, 1 (4) 0, 0

SECTION-B

36. Four-point masses (each of mass *m*) are arranged in the *X*-*Y* plane. The moment of inertia of this array of masses about *Y*-axis is;



(1) 6 ma^2 (2) 12 ma^2

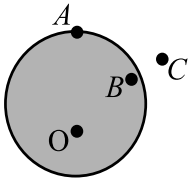
(3) 18 ma^2 (4) 24 ma^2

37. A photon of energy 5 eV is incident on a metal surface of work function 3 eV. Maximum K.E. of the emitted photo electrons will be;

(1) 0 eV (2) 1 eV

(3) 2 eV (4) 10 eV

38. In the given figure, there is a hollow sphere. At which points will the gravitational potential due to the sphere be the same?



(1) O, A, B, C (2) O, A, B

(3) O, B (4) No where

39. In a series resonant *R*-*L*-*C* circuit, if *L* is increased by 25% and *C* is decreased by 20%, then the resonant frequency of the circuit will;

(1) Increases by 10%
(2) Decreases by 10%
(3) Remains unchanged
(4) Increases by 2.5%

40. A 7m aluminum wire ($Y = 7 \times 10^{10}$ N/m^2) of diameter 4 mm supports a 100 kg mass. In order to have the same elongation in a copper wire ($Y = 12 \times 10^{10}$ N/m^2) of the same length under the same weight, the diameter of copper wire should be nearly (in mm) (Neglect own weight of aluminum and copper wire);

(1) 1.75 (2) 2.0

(3) 3 (4) 5.0

41. An air bubble in glass slab ($\mu = 1.5$) when viewed normally from one side appears at 6 cm and when viewed from other side appear at 4 cm, then thickness of slab is;

(1) 3.75 cm (2) 3 cm
(3) 15 cm (4) 25 cm

42. If a proton enters a region of uniform magnetic field with a velocity v perpendicular to the magnetic field, then the time period of revolution is T. If the proton enters with a velocity of $2v$, the time period will be

(1) T (2) $2T$
(3) $3T$ (4) $4T$

43. A 20 V battery with internal resistance 1.5 Ω is connected across a variable resistance R. The value of R for which the power delivered to it is maximum is equal to;

(1) 0.5 Ω (2) 1Ω
(3) 1.5Ω (4) 2Ω

44. For diatomic ideal gas, the relation between absolute pressure of a gas and temperature T is given by $P \propto T^C$. Then value of c will be; (For adiabatic process)

(1) $\frac{9}{2}$ (2) $\frac{2}{7}$
(3) $\frac{5}{7}$ (4) $\frac{7}{2}$

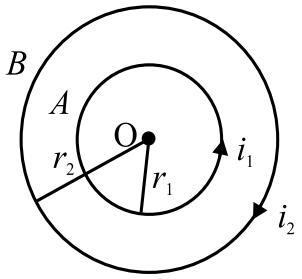
45. The decreasing order of wavelength of infrared, microwave, ultraviolet ray and gamma rays is;

(1) microwave, infrared rays, ultraviolet rays, gamma rays
(2) infrared rays, microwave, ultraviolet rays, gamma rays
(3) gamma rays, ultraviolet rays, infrared rays, microwaves
(4) microwaves, gamma rays, infrared rays, ultraviolet ray

46. The root mean square velocity of hydrogen gas molecules at 300 K is 3860 m/s. Then the r.m.s. velocity of oxygen gas molecules at 1200 K will be;

(1) 482.5 m/s (2) 965.0 m/s
(3) 1930 m/s (4) 3860 m/s

47. A and B are two concentric circular loop carrying current i_1 and i_2 as shown in figure. If ratio of their radii is 1 : 3 and ratio of the magnitude of magnetic field at the center O due to loop A and B is 1 : 4, then the value of $\frac{i_1}{i_2}$ will be;



(1) $\frac{1}{6}$ (2) $\frac{1}{3}$
(3) $\frac{1}{4}$ (4) $\frac{1}{12}$

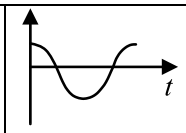
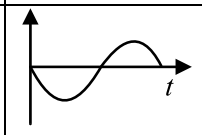
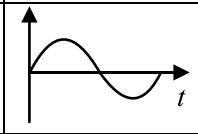
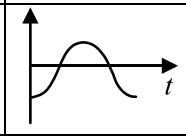
48. In a sonometer wire, the tension in wire is maintained by suspending a mass M from free end of wire. The fundamental frequency of vibration of the wire is N Hz. If the suspended mass is completely immersed in water the fundamental frequency will;

(1) increases (2) constant
(3) decreases (4) none of these

49. A coil having an area A_0 is placed in a magnetic field directed perpendicular to the plane of coil, which changes from B_0 to $4B_0$ in a time interval t. The e.m.f. induced in the coil will be;

(1) $\frac{3A_0B_0}{t}$ (2) $\frac{4A_0B_0}{t}$
(3) $\frac{A_0B_0}{t}$ (4) zero

50. The displacement of a particle in SHM is given by $x = a \sin \omega t$. Match the List.

List-I		List-II	
(A)	Graph between displacement and time	(I)	
(B)	Graph between velocity and time	(II)	
(C)	Graph between acceleration and time	(III)	
		(IV)	

(1) (A)-(I); (B)-(II); (C)-(III)
(2) (A)-(II); (B)-(I); (C)-(IV)
(3) (A)-(III); (B)-(I); (C)-(II)
(4) (A)-(IV); (B)-(II); (C)-(I)

(CHEMISTRY)

SECTION-A

51. The spin only magnetic moment of Mn^{2+} ion is;
(1) $\sqrt{35}$ BM (2) $\sqrt{25}$ BM
(3) $\sqrt{15}$ BM (4) $\sqrt{16}$ BM

52. The number of possible enantiomeric pairs that can be produced during mono-chlorination of 2-Methylbutane is;
(1) Four (2) Three
(3) One (4) Two

53. Find **true** and **false** from the following statements regarding carbohydrates;
S_1: Sucrose is a non reducing sugar.
S_2: Lactose is an oligosaccharide.
S_3: Glycosidic bond is present between C_1 of α-glucose and C_2 of β-fructose in sucrose.
S_4: Lactose is made of α-D-Glucose only.
(1) TTTF (2) TFTF
(3) FTTF (4) FTTT

54. The **correct** IUPAC name of the given compound is;
$[Pt(NH_3)_2Cl(NO_2)]$
(1) Diamminechloridonitrito-N-platinum(II)
(2) Diamminechloridonitrito-O-platinum(II)
(3) Diamminechloridonitrito-N-platinum(I)
(4) Diammoniachloridonitrito-O-platinum(II)

55. The geometry of $Ni(CO)_4$ and $[Ni(CN)_4]^{2-}$ are;
(1) both square planar
(2) tetrahedral and square planar, respectively
(3) both tetrahedral
(4) square planar and tetrahedral, respectively

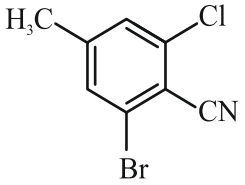
56. Identify X and Y in the following reaction sequence;
$C_3H_7Br \xrightarrow{X} product \xrightarrow{Y} C_4H_9NH_2$
(1) X = KCN, Y = $LiAlH_4$
(2) X = KCN, Y = H_3O^+
(3) X = CH_3NH_2, Y = $AlCl_3$/HCl
(4) X = CH_3NH_2, Y = HNO_2

57. If the energy difference between the ground state and the excited state of one electron species is 8.8×10^{-12} J, then wavelength of photon required to produce this transition is;
(Given: h = 6.63×10^{-34} Js)
(1) 2.26×10^{-12} m (2) 1.13×10^{-14} m
(3) 4.52×10^{-16} m (4) 2.26×10^{-14} m

58. The half-life period of a first order chemical reaction is 6.93 min. The time required for the completion of 80% of the chemical reaction will be;
(log 5 = 0.699)
(1) 230.3 min
(2) 23.03 min
(3) 16.1 min
(4) 460.6 min

59. Ammonium carbamate decomposes as:
$NH_2COONH_4(s) \rightleftharpoons 2NH_3(g) + CO_2(g)$
For the reaction. $K_p = 4 \times 10^{-6} atm^3$. If we start with 1 mole of the compound, then total pressure at equilibrium would be;
(1) 0.76 atm
(2) 0.05 atm
(3) 0.03 atm
(4) 0.021 atm

60. The IUPAC name of the following compound, is;



(1) 2-Bromo-4-chloro-6-methylbenzonitrile
(2) 2-Bromo-6-chloro-4-methylbenzonitrile
(3) 3-Bromo-6-chloro-4-methylbenzonitrile
(4) 3-Bromo-4-chloro-6-methylbenzonitrile

61. Match **List I** with **List II** and choose the **correct** option.

List I (Oxoacid of Phosphorus)		**List II (No. of P–H and P = O bonds)**	
(A)	Hypophosphorus acid	(I)	1 and 1
(B)	Phosphorus acid	(II)	0 and 1
(C)	Pyrophosphorus acid	(III)	0 and 2
(D)	Orthophosphoric acid	(IV)	2 and 1

(1) A-IV, B-I, C-III, D-II
(2) A-III, B-II, C-IV, D-I
(3) A-II, B-I, C-III, D-IV
(4) A-IV, B-III, C-II, D-I

62. At 80°C the vapour pressure of pure liquid 'A' is 400 mm of Hg and that of pure liquid 'B' is 800 mm of Hg. If a solution of 'A' and 'B' boils at 80°C and 1 atm pressure, then amount of 'A' in the mixture is;

(1) 52 mole percent
(2) 34 mole percent
(3) 10 mole percent
(4) 48 mole percent

63. Consider the reaction $A + B \rightleftharpoons C + D$, If initially the concentration of both A and B are both equal and at equilibrium, concentration of D is twice that of A, then what will be the equilibrium constant of reaction?

(1) $\frac{4}{9}$ (2) $\frac{9}{4}$
(3) $\frac{1}{9}$ (4) 4

64. The following two reactions of HNO_3 with Zn are given as (equations are not balanced):

(I) Zn + conc. $HNO_3 \rightarrow Zn(NO_3)_2 + X + H_2O$
(II) Zn + dil. $HNO_3 \rightarrow Zn(NO_3)_2 + Y + H_2O$

In reactions I and II, the compounds X and Y respectively, are;

(1) NO_2 and N_2O_5
(2) NO_2 and NO_2
(3) N_2O and NH_4NO_2
(4) NO_2 and N_2O

65. Which of the following molecules has zero dipole moment?

(1) CO_2 (2) BF_3
(3) SO_3 (4) All of these

66. Among the following amines,

(A) $C_6H_5NH_2$ (B) $C_2H_5NH_2$
(C) $(C_2H_5)_2NH$ (D) NH_3

The order of basicity is;

(1) A < D < B < C
(2) D < B < C < A
(3) D < A < B < C
(4) C < D < A < B

67. The **correct** IUPAC name of the given compound is;

$CH_3CH=CHCH(Cl)CH(Br)CH(CH_3)CH=CH_2$

(1) 4-Bromo-5-chloro-3-methylocta-1,6-diene
(2) 4-Bromo-5-chloro-6-methylocta-1,6-diene
(3) 4-Bromo-5-chloro-3-methylocta-2,7-diene
(4) 3-Methyl-4-bromo-5-chloroocta-1,6-diene

68. **Assertion (A):** The complex $[Co(NH_3)_6]^{3+}$ is paramagnetic in nature.

Reason (R): The complex $[Co(NH_3)_6]^{3+}$ is a low spin complex.

(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A).**
(3) **Assertion (A)** is true, but **Reason (R)** is false.
(4) **Assertion (A)** is false, but **Reason (R)** is true.

69. Select **correct** statement about the given reaction;

$NH_4NO_3 \xrightarrow{\Delta} N_2O + 2H_2O$

(1) Oxidation number of N has changed from –2 to +0
(2) Oxidation number of N in NH_4^+ is changed from –3 to +3 and that in NO_3^- is changed from +5 to +3.
(3) Oxidation number of N in NH_4^+ changed from +1 to 0 and that in NO_3^- changed from +5 to 0.
(4) Oxidation number of N in both NH_4^+ and NO_3^- is changed from –3 and +5 to +1.

70. 100 mL of 41.6%(wt/vol) $BaCl_2$ solution and 50 mL of 19.6% H_2SO_4 solution The mass of $BaSO_4$ formed will be; (Given molar mass of $BaSO_4$ = 233 g/mol and $BaCl_2$ = 208 g/mol)

(1) 2.33 g (2) 23.3 g
(3) 25.5 g (4) 233 g

71. **Statement I:** Total number of S–S bond in $Na_2S_2O_3$ is equal to zero.

Statement II: Total number of S=S bond in $Na_2S_2O_3$ is equal to one.

(1) Statement I and Statement II both are correct.
(2) Statement I and Statement II both are incorrect.
(3) Statement I is correct, but Statement II is incorrect.
(4) Statement I is incorrect, but Statement II is correct.

72. The specific conductivity of 1N KCl solution is 0.029 $\Omega^{-1}cm^{-1}$. If the cell constant of the cell is 0.1 cm^{-1} then conductance will be;

(1) 1.10 Ω^{-1} (2) 0.29 Ω^{-1}
(3) 0.56 Ω^{-1} (4) 2.80 Ω^{-1}

73. Which of the following compounds will react with acetone to form oxime?

(1) $C_6H_5NH_2$
(2) $C_6H_5NHNH_2$
(3) $NH_2NH–CO–NH_2$
(4) NH_2OH

74. Solutions A, B, C and D are respectively 0.2M glucose, 0.1M NaCl, 0.1M $BaCl_2$ and 0.2M $AlCl_3$. Which one of the following pairs is isotonic (Assuming 100% dissociation of electrolytes)?

(1) A and B (2) B and C
(3) A and D (4) A and C

75. Calculate the molality (m) of 2M solution of NaCl whose density is 1.30g mL^{-1}?

(1) 1.5m (2) 1.8m
(3) 2.0m (4) 1.69m

76. An organic compound X is oxidised by using acidified $K_2Cr_2O_7$. The product obtained reacts with phenyl hydrazine but does **not** give silver mirror test and iodoform test. The possible structure of X is;

(1) CH_3CH_2OH
(2) $CH_3CH_2CH(OH)CH_2CH_3$
(3) $(CH_3)_2CHOH$
(4) CH_3CHO

77. Total number of sigma bonds in the given compound are;

$CH_3CH(Br)CH(Br)CH_3$

(1) 12 (2) 10
(3) 11 (4) 13

78. Given below are two statements: one is labelled as **Assertion (A)** and other is labeled as **Reason (R)**

Assertion (A): The hybiridisation of each carbon in graphite is sp^3.

Reason (R): In graphite the electrons are delocalized over the whole sheet therefore graphite conducts electricity.

In the light of above statements choose the **correct** answer from the options given below.

(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A).**
(3) **Assertion (A)** is true, but **Reason (R)** is false.
(4) **Assertion (A)** is false, but **Reason (R)** is true.

79. **Statement I:** Fullerenes are the only pure form of carbon and they have dangling bonds.

Statement II: Buckminster Fullerene contains six and five membered rings of carbon atoms.

(1) Statement I and Statement II both are correct.
(2) Statement I and Statement II both are incorrect.
(3) Statement I is correct, but Statement II is incorrect.
(4) Statement I is incorrect, but Statement II is correct.

80. The Cannizzaro reaction is **not** given by;

(1) trimethyl acetaldehyde
(2) formaldehyde
(3) benzaldehyde
(4) acetaldehyde

81. Select the **incorrect** statement among the following;

(1) Oxidation product of 1,2-Ethanediol with HIO_4 is formaldehyde.
(2) CH_3OH is also called wood spirit.
(3) t-Butyl alcohol is converted to isobutene on heating with Cu.
(4) Hoffmann bromamide reaction produce 2° amines.

82. If the IE_1, IE_2, IE_3, IE_4 and IE_5 of an element are 8, 15, 36, 50, 200 eV respectively. Then element is likely to be;

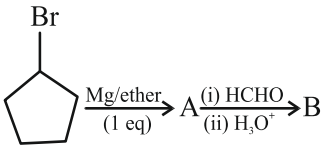
(1) Na (2) Si
(3) F (4) Ca

83. $A \xleftarrow[(ii)\,H_2O_2,\,OH^-]{(i)\,B_2H_6(THF)} CH_3CH_2C{\equiv}CH \xrightarrow[H_2SO_4]{HgSO_4(aq)} B$

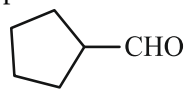
Identify product A and B in the above reactions;

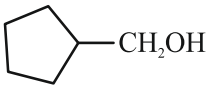
(1) $CH_3CH_2CH_2OH$, CH_3COCH_3
(2) $CH_3CH_2CH_2CHO$, $CH_3COCH_2CH_3$
(3) $CH_3CH_2CH_2CHO$, $CH_3CH(OH)CH_2CH_3$
(4) CH_3CH_2COOH, CH_3COCH_3

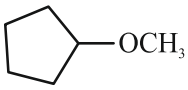
84.

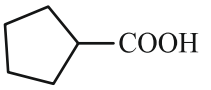


The product B in the above reaction is;

(1) 

(2) 

(3) 

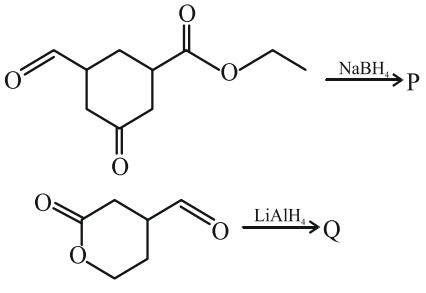
(4) 

85. The element with atomic number 57 belongs to;

(1) s-block (2) p-block
(3) d-block (4) f-block

SECTION-B

86.



Sum of number of alcoholic groups in product (P) and (Q) is;

(1) 4 (2) 6
(3) 3 (4) 5

87. Which of the following statements is/are **true** about HCOOH?
(1) It is a stronger acid than CH_3COOH.
(2) It reduces Tollen's reagent.
(3) It gives CO and H_2O on heating with conc. H_2SO_4.
(4) All of these

88. **Assertion (A):** The basicity of H_3PO_4 is four.
Reason (R): H_3PO_4 contains one P=O bond.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A).**
(3) **Assertion (A)** is true, but **Reason (R)** is false.
(4) **Assertion (A)** is false, but **Reason (R)** is true.

89. Considering the entropy(S) as a thermodynamic parameter, the criterion for the spontaneity of any process is;
(1) $\Delta S_{system} + \Delta S_{surrounding} > 0$
(2) $\Delta S_{system} - \Delta S_{surrounding} > 0$
(3) $\Delta S_{system} < 0$ only
(4) $\Delta S_{surrounding} < 0$ only

90. Which of the following complexes are expected to be coloured?
(1) $[Ti(NO_3)_4]$
(2) $\left[Cu\left(NCCH_3\right)_4\right]^+BF_4^-$
(3) $[Co(NH_3)_6]Cl_3$
(4) $K_3[VF_6]$

91. The pH of 0.2 molar solution of the acid HA is 4. The value of the ionisation constant K_a of the acid is;
(1) 3×10^{-8}
(2) 2×10^{3}
(3) 5×10^{-8}
(4) 9×10^{-8}

92. The maximum number of spectral lines obtained in Bohr spectrum of hydrogen atom when an electron is de-excited from 6^{th} orbit to first excited orbit is;
(1) 10 (2) 5
(3) 8 (4) 15

93. The wavelength associated with a golf ball weighing 500 g and moving at a speed of 10 m h^{-1} is;
(Given: h = 6.63×10^{-34} Js)
(1) 1×10^{-30} m
(2) 2.7×10^{-30} m
(3) 4.7×10^{-31} m
(4) 5.7×10^{-31} m

94. For the reaction,
$2N_2O_5(g) \rightarrow 4NO_2(g) + O_2(g)$
If the concentration of NO_2 increases by 4.4×10^{-2}M in 100 s, then the rate of the reaction is;
(1) $1.1 \times 10^{-4}\,Ms^{-1}$ (2) $0.5 \times 10^{-4}\,Ms^{-1}$
(3) $7.6 \times 10^{-4}\,Ms^{-1}$ (4) $2 \times 10^{-4}\,Ms^{-1}$

95. What is the boiling points of the liquid if molar heat of vaporization is 12 kJ/mol and molar entropy change is 32 J $mol^{-1}K^{-1}$?
(1) 375°C (2) 375 K
(3) 273 K (4) 102°C

96. The reduction potential of hydrogen half-cell will be negative if;
(1) $p(H_2)$ = 2 atm and $[H^+]$ = 4.0 M
(2) $p(H_2)$ = 1 atm and $[H^+]$ = 2.0 M
(3) $p(H_2)$ = 2 atm and $[H^+]$ = 1.0 M
(4) $p(H_2)$ = 2 atm and $[H^+]$ = 3.0 M

97. $CH_3COOH \xrightarrow{LiAlH_4} X \xrightarrow[300°C]{Cu} Y \xrightarrow[(ii)\,\Delta]{(i)\,dil.NaOH} Z.$
The IUPAC name of the product Z in the above reaction sequence is;
(1) Butan-2-ol (2) But-2-enal
(3) Butanal (4) But-2-ene

98. Match **List I** with **List II** and choose the **correct** option.

List I (Species)		**List II (Hybridisations)**	
(A)	NH_3	(I)	sp^3d^3
(B)	PCl_5	(II)	sp^3d
(C)	XeF_4	(III)	sp^3
(D)	IF_7	(IV)	sp^3d^2

(1) A-I, B-II, C-IV, D-III
(2) A-III, B-II, C-IV, D-I
(3) A-II, B-I, C-III, D-IV
(4) A-II, B-III, C-IV, D-I

99. Which of the following is **not** an example of disproportionation reaction?
(1) $3H_3PO_2 \rightarrow 2H_3PO_3 + PH_3$
(2) $3Cl_2 + 6OH^- \rightarrow 5Cl^- + ClO_3^- + 3H_2O$
(3) $2H_2O_2 \rightarrow 2H_2O + O_2$
(4) $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

100. **Statement I:** Oxidation number of Cr in CrO_5 is 6.
Statement II: Peroxide bond is present in CrO_5.
(1) Statement I and Statement II both are correct.
(2) Statement I and Statement II both are incorrect.
(3) Statement I is correct, but Statement II is incorrect.
(4) Statement I is incorrect, but Statement II is correct.

(BOTANY)

SECTION-A

101. Among these which pair of organisms belong to the same genus?
(1) Lion and cats
(2) Potato and brinjal
(3) Mango and wheat
(4) House fly and man

102. Identify the **incorrect** statement.
(1) The vast majority of bacteria are heterotrophs, i.e., they depend on other organisms or on dead organic matter for food.
(2) Archaebacteria are special since they live in some of the most harsh habitats.
(3) Cyanobacteria are photosynthetic autotrophs that are classified under kingdom Protista.
(4) The Mycoplasma are organisms that completely lack a cell wall.

103. Methanogens belong to;
(1) eubacteria. (2) archaebacteria.
(3) slime moulds. (4) dinoflagellates.

104. Identify the **correctly** matched pair.
(1) *Ectocarpus* - Green algae
(2) *Porphyra* - Red algae
(3) *Laminaria* - Red algae
(4) *Polysiphonia* - Brown algae

105. Identify the organism that has flagellated gametes.
(1) *Porphyra* (2) *Gracilaria*
(3) *Sargassum* (4) *Spirogyra*

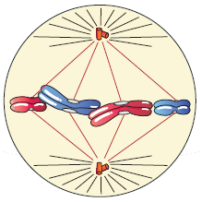
106. In some plants, like grasses, roots arise from parts of the plant other than the radicle and are called;
(1) tap roots.
(2) fibrous roots.
(3) adventitious roots.
(4) either tap roots or adventitious roots.

107. **Assertion (A):** In china rose, mustard and sun flower plants opposite type of phyllotaxy is found.
Reason (R): In opposite type of phyllotaxy, a pair of leaves arise at each node and lie opposite to each other.
(1) Both **Assertion (A)** and **Reason (R)** are the true and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are the true but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true and **Reason (R)** is false.
(4) **Assertion (A)** is false and **Reason (R)** is true.

108. All of the following are the parts of stomatal apparatus, **except**;
(1) trichomes. (2) stomatal aperture.
(3) guard cells. (4) subsidiary cells.

109. Closed vascular bundles lack;
(1) xylem. (2) phloem.
(3) cambium. (4) pith.

110. Consider the following figure and identify the **correct** stage of mitosis and its characteristics.



(1) Prophase - Chromosomes are seen to be composed of two chromatids attached together at the centromere.
(2) Metaphase - Chromosomes are moved to spindle equator and get aligned along metaphase plate through spindle fibres to both poles.
(3) Anaphase - Centromeres split and chromatids separate.
(4) Telophase - Chromosomes cluster at opposite spindle poles and their identity is lost as discrete elements.

111. **Assertion (A):** In eukaryotic cells, extensive compartmentalization of cytoplasm is observed.
Reason (R): Membrane bound organelles are present in eukaryotic cells.
(1) Both **Assertion (A)** and **Reason (R)** are the true and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are the true but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true and **Reason (R)** is false.
(4) **Assertion (A)** is false and **Reason (R)** is true.

112. Identify the **incorrect** statement w.r.t cytokinesis.
(1) In an animal cell, cytokinesis is achieved by the appearance of a furrow in the plasma membrane.
(2) The furrow gradually deepens and ultimately joins in the centre dividing the cell cytoplasm into two in animal cells.
(3) At the time of cytoplasmic division, organelles like mitochondria and plastids get distributed between the two daughter cells.
(4) In some organisms, cytokinesis is not followed by karyokinesis as a result of which multinucleate condition arises leading to the formation of syncytium.

113. **Statement I:** The bundle sheath cells are rich in an enzyme ribulose bisphosphate carboxylase-oxygenase (RuBisCO), but lack PEPcase in C_4 plants.
Statement II: The Calvin pathway is common to the C_3 and C_4 plants.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct but Statement II is incorrect.
(3) Statement I is incorrect but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

114. Identify the **incorrect** statement w.r.t chemiosmotic hypothesis in photosynthesis.
(1) Splitting of the water molecule takes place on the inner side of the thylakoid membrane.
(2) ATP synthesis is linked to development of a proton gradient across the membrane of thylakoids.
(3) The accumulation of proton is towards the inside of the thylakoid membrane, i.e., in the lumen of thylakoids.
(4) The NADP reductase enzyme is located on the lumen side of the thylakoid membrane.

115. Match **List-I** with **List-II** to find out the **correct** option.

List-I		**List-II**	
(I)	Glycolysis	(A)	The electron passes from one carrier to another
(II)	Fermentation	(B)	Complete oxidation of organic substances in the presence of oxygen
(III)	Aerobic respiration	(C)	Incomplete oxidation of glucose under anaerobic conditions
(IV)	Electron transport system	(D)	Partial oxidation of glucose in all organisms

	I	**II**	**III**	**IV**
(1)	D	C	B	A
(2)	C	B	D	A
(3)	B	D	A	C
(4)	D	A	B	C

116. In glycolysis, the number of steps where ATP is utilized, is;
(1) one.
(2) two.
(3) three.
(4) four.

117. Identify the hormone that prevents fruit and leaf drop at early stages but promote the abscission of older mature leaves and fruits.
(1) Auxins (2) Gibberellins
(3) Cytokinins (4) Ethylene

118. **Assertion (A):** Majority of insect-pollinated flowers are large, colourful, fragrant and rich in nectar.
Reason (R): Nectar and pollen grains are the usual floral rewards for biotic pollinators.
(1) Both **Assertion (A)** and **Reason (R)** are the true and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are the true but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true and **Reason (R)** is false.
(4) **Assertion (A)** is false and **Reason (R)** is true.

119. Identify the **odd** one w.r.t ploidy of given cells.
(1) Nucellus
(2) Integuments
(3) Synergids
(4) Megaspore mother cell

120. **Statement I:** Mendel conducted artificial pollination/cross pollination experiments using several true-breeding pea lines.
Statement II: A true breeding line is one that, having undergone continuous cross-pollination, shows the stable trait inheritance and expression for several generations.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct but Statement II is incorrect.
(3) Statement I is incorrect but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

121. Identify the statement that is **not** true regarding polygenic traits.
(1) Such traits are generally controlled by three or more genes.
(2) In polygenic traits a single gene can exhibit multiple phenotypic expressions.
(3) Besides the involvement of multiple genes it also takes into account the influence of environment.
(4) Human skin colour is classic example for this.

122. The homologous chromosomes separate, while sister chromatids remain associated at their centromeres at _____ stage of meiosis.
(1) anaphase I (2) telophase I
(3) anaphase II (4) telophase II

123. Identify the **correct** statements.

A. In RNA, every nucleotide residue has an additional –OH group present at 2'-position in the ribose.

B. In RNA, thymine is found at the place of uracil.

C. The bases in two strands of DNA are paired through phosphodiester bond.

D. The two chains of DNA are coiled in a right-handed fashion.

Select the **correct** option.

(1) A and B (2) B and C

(3) C and D (4) A and D

124. The enzyme that is responsible for transcription of heterogeneous nuclear RNA (hnRNA) in eukaryotes is;

(1) RNA polymerase III.

(2) RNA polymerase II.

(3) RNA polymerase I.

(4) DNA polymerase.

125. Identify the **incorrect** statement.

(1) Depending on base composition (A:T rich or G:C rich), length of segment, and number of repetitive units, satellite DNA is classified in micro-satellites and mini-satellites etc.

(2) The technique of DNA fingerprinting was initially developed by Alec Jeffreys.

(3) Polymorphisms are non-inheritable from parents to children.

(4) DNA fingerprinting is the basis of paternity testing, in case of disputes.

126. Identify the **correctly** matched pair w.r.t *lac* operon.

(1) Regulatory genes - *z, y, a* genes

(2) Structural gene - *i* gene

(3) Beta-galactosidase - *z* gene

(4) Transacetylase - *y* gene

127. Match **List-I** with **List-II** to find out the **correct** option.

List-I		**List-II**	
(I)	*Saccharomyces cerevisiae*	(A)	Statins
(II)	*Streptococcus*	(B)	Streptokinase
(III)	*Trichoderma polysporum*	(C)	Ethanol
(IV)	*Monascus purpureus*	(D)	Cyclosporin A

	I	**II**	**III**	**IV**
(1)	D	C	B	A
(2)	C	B	D	A
(3)	B	D	A	C
(4)	D	A	B	C

128. **Statement I:** Resource (food and space) availability is obviously essential for the unimpeded growth of a population.

Statement II: Since resources for growth for most animal populations are finite and become limiting sooner or later, the logistic growth model is considered a more realistic one.

(1) Statement I and Statement II both are correct.

(2) Statement I is correct but Statement II is incorrect.

(3) Statement I is incorrect but Statement II is correct.

(4) Statement I and Statement II both are incorrect.

129. Identify the **incorrect** statement.

(1) Energy at a lower trophic level is always less than at a higher level.

(2) The pyramid of biomass in sea is generally inverted.

(3) Trophic level represents a functional level, not a species as such.

(4) A given species may occupy more than one trophic level in the same ecosystem at the same time.

130. Match **List-I** with **List-II** to find out the **correct** option.

List-I		**List-II**	
(I)	*Funaria, Polytrichum* and *Sphagnum*	(A)	Dominant phase in the life cycle is the sporophytic plant body
(II)	Horsetails and ferns	(B)	Male and the female gametophytes do not have an independent free-living existence
(III)	Gymnosperms	(C)	The gametes are pyriform (pear-shaped)
(IV)	*Laminaria, Sargassum* and *Fucus*	(D)	Dominant phase in the life cycle is gametophytic plant body

	I	**II**	**III**	**IV**
(1)	D	C	B	A
(2)	C	B	D	A
(3)	B	D	A	C
(4)	D	A	B	C

131. Extinction of Steller's sea cow and passenger pigeon were due to;

(1) alien species invasions.

(2) co-extinctions.

(3) over-exploitation.

(4) habitat loss and fragmentation.

132. Identify the **correct** number of *ex-situ* conservation approaches for conservation of biodiversity from the list given below.

Biosphere reserves, zoological parks, wildlife sanctuaries, botanical gardens and wildlife safari parks

(1) One (2) Two
(3) Three (4) Four

133. In the embryo sac, three cells present at the chalazal end are together called the;

(1) egg apparatus.
(2) synergids.
(3) antipodals.
(4) central cell.

134. Identify the plant growth regulator that promotes rapid internode/petiole elongation in deep water rice plants.

(1) Auxin
(2) Cytokinin
(3) Ethylene
(4) Gibberellins

135. Identify the **incorrect** statements w.r.t photo-phosphorylation.

A. The splitting of water is associated with the PS I.
B. In photosystem II the reaction centre chlorophyll *a* absorbs 680 nm wavelength of light.
C. In PS I the reaction centre chlorophyll *a* has an absorption peak at 700 nm.
D. When the two photosystems work in a series, first PS I and then the PS II, a process called non-cyclic photo-phosphorylation occurs.
E. Both ATP and NADPH + H^+ are synthesised in non-cyclic photo-phosphorylation.

(1) A, B and E (2) C, D and E
(3) A and D (4) C and E

SECTION B

136. **Statement I:** The regions of chromatin that are more densely packed and stain dark are called as euchromatin.

Statement II: The chromatin that is more loosely packed and stains light and is referred to as heterochromatin.

(1) Statement I and Statement II both are correct.
(2) Statement I is correct but Statement II is incorrect.
(3) Statement I is incorrect but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

137. Identify the **incorrect** statement.

(1) The DNA sequence coding for tRNA or rRNA molecule is defined as a gene.
(2) The coding sequences or expressed sequences of DNA are defined as exons.
(3) Introns are said to be those sequence that appear in mature or processed RNA.
(4) In eukaryotes, the monocistronic structural genes have interrupted coding sequences.

138. Match **List-I** with **List-II** to find out the **correct** option.

List-I		**List-II**	
(I)	Parasitism	(A)	Mycorrhizae
(II)	Commensalism	(B)	Ticks on dogs
(III)	Mutualism	(C)	Abingdon tortoise in Galapagos islands became extincted due to introduction of goats
(IV)	Competition	(D)	Barnacles growing on the back of a whale

	I	**II**	**III**	**IV**
(1)	D	C	B	A
(2)	C	B	D	A
(3)	B	D	A	C
(4)	D	A	B	C

139. Identify the **correctly** matched pair.

(1)	The Earth Summit	Rio de Janeiro in 2002
(2)	World Summit on Sustainable Development	Johannesburg in 2002
(3)	The Earth Summit	Johannesburg in 1992
(4)	World Summit on Sustainable Development	Rio de Janeiro in 1992

140. Identify the **correct** statements.

A. Colour blindness is a sex-linked recessive disorder.
B. Haemophilia is an autosome linked recessive disease.
C. Sickle-cell anaemia is an autosome linked recessive trait.
D. Phenylketonuria, an inborn error of metabolism is inherited as the sex-linked recessive trait.
E. Thalassemia is an autosome-linked recessive blood disease.

(1) A and C only
(2) B and D only
(3) A, C and E
(4) C, D and E

141. Match **List-I** with **List-II** to find out the **correct** option.

List-I		List-II	
(I)	Gibberellins	(A)	Stimulates the closure of stomata
(II)	Cytokinin	(B)	Promote nutrient mobilisation
(III)	Ethylene	(C)	Speed up the malting process in brewing industry
(IV)	Abscisic acid	(D)	Breaks seed and bud dormancy

	I	II	III	IV
(1)	D	C	B	A
(2)	C	B	D	A
(3)	B	D	A	C
(4)	D	A	B	C

142. **Assertion (A):** The respiratory quotient of tripalmitin is 0.7.
Reason (R): When tripalmitin is used as a respiratory substrate, 102 molecules of CO_2 are released and 145 molecules of O_2 are utilised, per two molecules of tripalmitin.
(1) Both **Assertion (A)** and **Reason (R)** are the true and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are the true but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true and **Reason (R)** is false.
(4) **Assertion (A)** is false and **Reason (R)** is true.

143. Identify the **incorrect** statement(s).
A. Geitonogamy is transfer of pollen grains from the anther to the stigma of another flower of the same plant.
B. Geitonogamy is functionally cross-pollination.
C. Geitonogamy is the only type of pollination which during pollination brings genetically different types of pollen grains to the stigma.
D. Xenogamy is the transfer of pollen grains from anther to the stigma of a different plant.
(1) A and D (2) B and C
(3) Only B (4) Only C

144. **Statement I:** Centrosome is an organelle usually containing two cylindrical structures called centrioles.
Statement II: The centrioles form the basal body of cilia or flagella, and spindle fibres that give rise to spindle apparatus during cell division in plant cells.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct but Statement II is incorrect.
(3) Statement I is incorrect but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

145. From the following, identify the organism that shows isogamous type of sexual reproduction with flagellated gametes.
(1) *Spirogyra* (2) *Eudorina*
(3) *Ulothrix* (4) *Fucus*

146. Identify the pair of plants that show imbricate type of aestivation.
(1) *Calotropis* and china rose
(2) Lady's finger and cotton
(3) *Cassia* and gulmohur
(4) Cotton and china rose

147. Identify the **incorrect** statement w.r.t monocotyledonous stem.
(1) The monocot stem has a sclerenchymatous hypodermis.
(2) It has a large number of scattered vascular bundles, each surrounded by a sclerenchymatous bundle sheath, and a large, conspicuous parenchymatous ground tissue.
(3) Vascular bundles are conjoint and closed.
(4) The phloem parenchyma is present, and water-containing cavities are absent within the vascular bundles.

148. Endoplasmic reticulum (ER), golgi complex, lysosomes and vacuoles are considered together as the part of endomembrane system because;
(1) their functions are coordinated.
(2) their functions are not coordinated.
(3) they are membrane bound vesicular structures.
(4) they produce cellular energy in the form of ATP.

149. Formation of complex structure called synaptonemal complex takes place at _____ phase of prophase I.
(1) leptotene
(2) zygotene
(3) pachytene
(4) diplotene

150. **Assertion (A):** There are a total of six different genotypes of the human ABO blood types.
Reason (R): There are six different combinations of three alleles I^A, I^B and i.
(1) Both **Assertion (A)** and **Reason (R)** are the true and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are the true but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true and **Reason (R)** is false.
(4) **Assertion (A)** is false and **Reason (R)** is true.

(ZOOLOGY)

SECTION-A

151. Which of the following represents improved programmes covering wider reproduction-related areas in India?
(1) Reproductive and Child Health Care
(2) Reproductive and Family Health Care
(3) Family Planning Programmes
(4) Family Welfare Schemes

152. **Statement I**: The neural system provides an organised network of point-to-point connections for a quick coordination.
Statement II: The endocrine system provides chemical integration through hormones.
(1) Both statement I and statement II are incorrect.
(2) Both statement I and statement II are correct.
(3) Statement I is correct but statement II is incorrect.
(4) Statement I is incorrect but statement II is correct.

153. α -helix and β-pleated sheet are;
(1) secondary structures of nucleic acids.
(2) secondary structures of proteins.
(3) primary structures of proteins.
(4) linear chains of proteins.

154. Which of the following bacteria is a source of EcoRI?
(1) *Entamoeba coli* RY 13
(2) *Entamoeba coli* R 11
(3) *Escherichia coli* RY 13
(4) *Escherichia coli* RX 15

155. The process of release of urine i.e., micturition causes due to;
(1) relaxation of smooth muscles of the bladder and contraction of urethral sphincter.
(2) contraction of smooth muscles of the bladder and relaxation of urethral sphincter.
(3) contraction of skeletal muscles of the bladder and relaxation of urethral sphincter.
(4) relaxation of skeletal muscles of the bladder and contraction of urethral sphincter.

156. Select the **incorrect** statement w.r.t. circulatory system in humans.
(1) The SAN can generate the maximum number of action potentials.
(2) Blood pressure in the pulmonary artery is more than that in the pulmonary vein.
(3) The hepatic portal vein drains blood to liver from intestine.
(4) Ventricular systole increases the flow of blood into the ventricles from atria by about 30 percent.

157. Which of the following hormones does **not** interact with intracellular receptors?
(1) Cortisol
(2) Iodothyronine
(3) Glucagon
(4) Estradiol

158. All of the following are extinct group of animals, **except;**
(1) Therapsids
(2) Pelycosaurs
(3) Tuataras
(4) *Tyrannosaurus*

159. Which one of the given options **correctly** identifies certain component(s) of pBR322?
(1) amp^R, tet^R – Antibiotic resistance genes
(2) *Hind* III, *Eco*RI – Selectable markers
(3) Ori – Original restriction enzyme
(4) rop – Reduced osmotic pressure

160. Neutrophils and macrophages of the human body exhibit which type of movement?
(1) Amoeboid movement
(2) Ciliary movement
(3) Flagellar movement
(4) Muscular movement

161. Most of the major organ systems in humans are formed in a developing foetus by the end of;
(1) 4^{th} week of gestation.
(2) 1^{st} trimester.
(3) 20 weeks of pregnancy.
(4) 2^{nd} trimester.

162. **Statement I**: In RNAi, the genes are silenced using dsRNA.
Statement II: Transgenic mice is used in polio vaccine production.
(1) Both statement I and statement II are correct.
(2) Both statement I and statement II are incorrect.
(3) Statement I is correct but statement II is incorrect.
(4) Statement I is incorrect but statement II is correct.

163. All of the following are correct for dense irregular connective tissue, **except;**
(1) It has fibroblasts
(2) Fibres are mostly elastin
(3) Fibres are oriented differently
(4) It is present in the skin

164. All of the following are ill-effects of various contraceptive methods, **except;**
(1) Irregular menstrual bleeding.
(2) Breast cancer.
(3) Osteoarthritis.
(4) Nausea.

165. Which of the following statements is **not true**?
(1) The entire heart is made of cardiac muscles.
(2) SAN is present in the right upper corner of right atrium.
(3) Aorta carries oxygenated blood.
(4) Tricuspid valve is also called mitral valve.

166. Select the **incorrect** match.
(1) 70% of CO_2 – Carried as bicarbonate
(2) Asthma – Decreased respiratory surface
(3) Oxygen dissociation curve – Sigmoid in shape
(4) Occupational respiratory disorders – Proliferation of fibrous tissues

167. In addition to *ori*, the vector requires a selectable marker because it helps in;
(1) identifying and eliminating transformants.
(2) selectively permitting the growth of the transformants.
(3) protein synthesis involved in the replication of plasmid.
(4) selection of antibiotic using non-recombinants.

168. The process where a single ancestor species rapidly diversifies into a variety of forms, each adapted to a specific ecological niche is called;
(1) adaptive radiation.
(2) co-evolution.
(3) adaptive convergence.
(4) convergent evolution.

169. The drug which is known for its effects mainly on the cardiovascular system of the body is obtained by;
(1) *Papaver somniferum.*
(2) *Cannabis sativa.*
(3) *Atropa belladonna.*
(4) *Erythroxylum coca.*

170. Which among the following belongs to the second largest phylum of kingdom Animalia?
(1) *Octopus*
(2) *Laccifer*
(3) *Hirudinaria*
(4) *Echinus*

171. In cockroaches, forewings arise from **__X__** and hindwings arise from **__Y__**.
Select the option that **correctly** identifies '**X**' and '**Y**'.

	X	**Y**
(1)	Prothorax	Mesothorax
(2)	Mesothorax	Metathorax
(3)	Metathorax	Mesothorax
(4)	Prothorax	Metathorax

172. Select the **correct** match w.r.t. human heart.
(1) Atrio-ventricular septum – Thin muscular tissue
(2) Atria – Small upper chambers
(3) Pericardium – Single walled membranous bag
(4) Chordae tendineae – Present in atrium

173. A thin flap of connective tissue that interconnects the two lobes of thyroid gland is called _____.
(1) Pineal (2) Corpus callosum
(3) Isthmus (4) Follicles

174. **Statement I:** Skin on our body is the main physical barrier which prevents entry of the micro-organisms.
Statement II: Microbial growth is prevented by acid in the stomach, saliva in the mouth, tears from eyes.
(1) Both statement I and statement II are correct.
(2) Both statement I and statement II are incorrect.
(3) Statement I is correct but statement II is incorrect.
(4) Statement I is incorrect but statement II is correct.

175. Select the **incorrect** statement w.r.t. chemical conversions.
(1) In exothermic reactions, the energy level of product is lower than that of substrate.
(2) Formation of enzyme substrate complex is an obligatory step.
(3) The intermediate altered structural states between substrate and product are stable.
(4) Substrate has to go through a transition state for an exothermic or endothermic reaction.

176. The most recent ancestor of crocodiles among the following is _____.
(1) Therapsids (2) Sauropsids
(3) Thecodonts (4) Synapsids

177. *Pheretima* differs from *Physalia* with reference to all of the following features, **except**;
(1) Metamerically segmented body.
(2) Presence of nerve cells.
(3) Presence of closed circulatory system.
(4) Absence of metagenesis.

178. What is the primary function of the autonomic neural system within the peripheral nervous system?
(1) Controlling voluntary movements
(2) Regulating involuntary bodily functions
(3) Transmitting sensory information
(4) Maintaining cognitive processes

179. Which type of cells in seminiferous tubule provide nutrition to developing sperms?
(1) Leydig cells (2) Interstitial cells
(3) Sertoli cells (4) Somatic cells

180. Chronic use of which substance results in liver cirrhosis?
(1) Tobacco (2) Alcohol
(3) Infected needles (4) Serotonin

181. Neural tissue is a specialised tissue of ectodermal origin and majority of muscles are specialised tissue of;
(1) endodermal origin.
(2) ectodermal origin.
(3) mesodermal origin.
(4) endo-mesodermal origin.

182. **Statement I:** Each haemoglobin molecule can carry a maximum of four molecules of oxygen.
Statement II: The percentage of CO_2 transported as carbamino-haemoglobin is equal to the percentage of lymphocytes in total WBCs.
(1) Both statement I and statement II are correct.
(2) Both statement I and statement II are incorrect.
(3) Statement I is correct but statement II is incorrect.
(4) Statement I is incorrect but statement II is correct.

183. Mesoderm is present as scattered pouches in;
(1) *Hydra* and *Ctenoplana.*
(2) filarial worm and hookworm.
(3) magur and vulture.
(4) *Bombyx* and *Culex.*

184. Select the **incorrect** statement.
(1) The reproductive cycle in primates is called oestrous cycle.
(2) In human females, menstruation is repeated at an average interval of about 28/29 days.
(3) Menstrual flow results due to breakdown of endometrial lining of uterus.
(4) Menstruation only occurs if the released ovum is not fertilised.

185. Which physiological process is facilitated by the hyperosmolarity in the inner medullary interstitium?
(1) Filtration of blood in the glomerulus
(2) Secretion of waste products in the proximal convoluted tubule
(3) Reabsorption of water in the collecting ducts
(4) Active transport of ions in the distal convoluted tubule

SECTION-B

186. Choose the **incorrect** statement w.r.t. secondary metabolites.
(1) Abrin and ricin are lectins.
(2) Rubber and drugs are useful to human welfare.
(3) Codeine is an alkaloid.
(4) Anthocyanins are pigments.

187. **Statement I**: Lactational amenorrhea is considered effective upto 24 weeks following parturition.
Statement II: ZIFT involves the transfer of zygote or early embryos with upto 8 blastomeres into the fallopian tube.
(1) Both statement I and statement II are correct.
(2) Both statement I and statement II are incorrect.
(3) Statement I is correct but statement II is incorrect.
(4) Statement I is incorrect but statement II is correct.

188. Read the given statements w.r.t. human heart.
A. Heart is autoexcitable.
B. Its functions can be moderated by neural and hormonal mechanisms.
C. Heart of a human is neurogenic.
Select the option which includes only **correct** statement(s).
(1) A and C only (2) A only
(3) B and C only (4) A and B only

189. Select the **incorrect** statement.
(1) Production of body heat and erythrocytes are the functions of the skeletal system.
(2) Axial skeleton is aligned along the main axis of the body.
(3) In human beings, skeletal system is made up of 206 bones and a few cartilages.
(4) Fibrous joint allows no movement at all.

190. Roman number following the name of restriction enzymes indicates the;
(1) feature that distinguishes it from other enzymes.
(2) order in which the enzymes were isolated from that strain of bacteria.
(3) order of strain in that bacteria for same enzyme.
(4) class of enzyme to which it belongs.

191. **Assertion (A):** At the tissue level, formation of carbamino-haemoglobin occurs in RBCs.
Reason (R): In tissue, high pCO_2, low H^+ concentration and low temperature favour the formation of carbamino-haemoglobin.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) **Assertion (A)** is false, and **Reason (R)** is true.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.

192. **Statement I:** Indirect development occurs in *Saccoglossus* and *Ophiura*.
Statement II: Sexes are separate in *Planaria* and *Pterophyllum*.
(1) Both statement I and statement II are correct.
(2) Both statement I and statement II are incorrect.
(3) Statement I is correct but statement II is incorrect.
(4) Statement I is incorrect but statement II is correct.

193. Match **List-I** with **List-II** and choose the **correct** option.

List-I		**List-II**	
(A)	Anthropogenic action	(I)	Average weight of human child during birth
(B)	Stabilising selection	(II)	Herbicide resistance
(C)	Adaptive radiation	(III)	Industrial melanism
(D)	Dark-winged moths	(IV)	Darwin's finches

	A	**B**	**C**	**D**
(1)	II	I	IV	III
(2)	II	III	I	IV
(3)	III	I	IV	II
(4)	I	III	IV	II

194. A male frog can be distinguished externally from a female frog by all of the following features **except**;
A. Presence of sound producing vocal sacs.
B. Presence of copulatory pad on the first digit of the forelimbs.
C. Presence of nictitating membrane.
D. Presence of webbed digits on feet.
(1) A, B, C and D
(2) A and B only
(3) A, B and C only
(4) C and D only

195. Which of the following hormones acts on the middle thick layer of uterus and is released from maternal pituitary in response to foetal ejection reflex?
(1) Prolactin (2) Oxytocin
(3) GnRH (4) FSH

196. Select the **incorrect** statement.
(1) Sperms are formed within the seminiferous tubules.
(2) Implantation in morula stage of embryogenesis occurs in the uterus.
(3) Oogenesis is initiated during embryonic development.
(4) In humans, endometrium is shed to the outside of the body during menstrual phase.

197. Match **List-I** with **List-II** and choose the **correct** option.

List-I		**List-II**	
(A)	*Epidermophyton*	(I)	Ringworms
(B)	*Wuchereria*	(II)	Pneumonia
(C)	*Salmonella*	(III)	Elephantiasis
(D)	*Streptococcus*	(IV)	Typhoid

	A	**B**	**C**	**D**
(1)	I	III	II	IV
(2)	II	III	I	IV
(3)	III	II	IV	I
(4)	I	III	IV	II

198. **Assertion (A):** Insulin used for diabetes was earlier extracted from the pancreas of slaughtered cattle and pigs but now it is not used.
Reason (R): It carried the risk of contamination with other proteins or impurities, potentially causing allergic reactions or immune responses in patients.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

199. **Assertion (A):** Ionic gradients across the resting membrane are maintained by the active transport of ions by the sodium-potassium pump.
Reason (R): It transports $3Na^+$ inwards for $2K^+$ outward the cell.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

200. Complete the analogy and select the **correct** option w.r.t. selective tubular reabsorption.

Proximal convoluted tubule : maximum ::_____ : minimum

(1) Distal convoluted tubule.

(2) Ascending limb of Henle's loop.

(3) Descending limb of Henle's loop.

(4) Collecting duct.

■■■

SPACE FOR ROUGH WORK

PW Web/App - https://smart.link/7wwosivoicgd4

Library- https://smart.link/sdfez8ejd80if